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PREPARED TESTIMONY:
Meeting US Natural Gas Demand: The Challenge Ahead

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UNDERSTANDING THE CHALLENGE

Today the United States faces a very different natural gas market than that of the preceding two decades. A tightening of the balance between supply and demand, first evidenced in 2000, has led to higher and more volatile prices. Hurricane Katrina has only added to this picture by delivering a real shock, driving prices further up and creating considerable anxiety about the adequacy of winter supply. The run-up in natural gas prices, which has been under way for several years and has occasioned much anxiety in the United States, was predictable in the sense that its underlying cause—the inability of continental supply to keep pace with demand—has been recognized for many years. Since 2003, Cambridge Energy Research Associates (CERA) has been routinely warning that higher and more volatile natural gas prices would become the norm for the North American market.

Just as sustained higher prices were predictable, so has been the industry response to those prices. A surge in investment by companies seeking to bring new supplies, both from continental sources and imported in the form of liquefied natural gas (LNG), is well under way. However, meaningful growth in supply, mostly from LNG, will not be realized for a few more years. As a result, significant, sustained price relief will not come to the United States before 2008 at the earliest, and only then if LNG development is substantial.

This means that prices will remain strong and volatile for the next few years. The effects of Katrina will add to this, keeping prices even stronger at least through the coming winter. Without a strong dose of good news, prices should stay at higher levels until it is clear that the winter will not deliver a demand shock—and that will not be known until most of winter has passed.

Although fuel switching, or flexible demand, provides a few relief valves to the gas market, these valves are quite small. Real demand relief will come in part from demand destruction and, ultimately, from consumers who simply cannot afford the higher prices—which will also be reflected in unpaid utility bills. If actions such as encouraging the use of alternative fuels or advocating conservation are to be taken, and if these actions are to be efficacious for the approaching winter, they must be implemented immediately.

North American Continental Supply Not Expected to Keep Pace with Demand

The current market environment is driven fundamentally by a natural gas supply problem, with modest demand growth exceeding the ability of the gas industry to respond. The resource base in the United States has been producing gas for many decades; the largest basins have been thoroughly explored, and the largest fields are in decline. Accelerating decline rates for many existing wells is a fact of life in the gas exploration and production business. An oil and gas

company must first replace the production that was depleted from existing resources during the previous year before it can show any increase in net output. In addition to these factors, three issues have exacerbated the situation:

- a decade-old inability to grow natural gas production in the contiguous United States, rooted in the maturity of the resource base that is available for drilling
- the shift from strong growth in western Canadian gas production to a much slower rate of gas production growth in recent years
- a paucity of new, large continental discoveries in Canada, the United States, and Mexico—though not for lack of effort, as the industry's spending on exploration and development of new oil and gas resources has surged over the past several years

The large majority of North America's gas supply comes from mature producing areas. With America's breadbasket supply regions in collective decline, not enough growth is expected from the newer but smaller regions to offset the losses from the larger ones, resulting in a slow, continuous continental decline.

Strong evidence exists that adding more drilling rigs will not solve the problem. The drilling spike of 2000/01 and recent record drilling activity failed to grow supply. As an example, drilling for gas in the United States has surged by over 175 percent since 2002; yet, gas wellhead capacity is down by more than 2 percent over that period. CERA expects combined US and Canadian gas supply to remain essentially unchanged between 2004 and 2010, and to decline 12 percent from 2010 to 2020.

Although growth of new gas supplies will remain limited in those areas already open for exploration and production, additional gas resources are known to exist in areas that are currently off-limits. Land access will continue to be a key issue for natural gas production, especially in the Rockies, in many federal lands areas, and in politically sensitive offshore areas such as the West, East, and Florida Coasts of the United States. The nation will be challenged to balance choices between land-access restrictions and permitting delays, on the one hand, and the inevitable consequences of higher natural gas prices if no additional further lands are made available for gas production, on the other hand.

Arctic supplies of natural gas, from Alaska and the Canadian Arctic regions, will be needed to help offset increasing declines in the contiguous United States. However, it is important to note that these supplies are a decade off and are not sufficient to make up for declines from other regions.

Gas buyers and sellers are anticipating no real supply relief for the next few years and, consequently, no price relief either.

LNG: The New Supply Source

LNG is already the fastest-growing source of supply for the North American gas market, and LNG from many sources is expected to be cheaper than higher-cost domestic supplies. However, it will take time before a significant amount of additional LNG is available. The total worldwide LNG industry delivers about 19 billion cubic feet (Bcf) per day. By CERA's estimates, the combined US and Canadian market will require about 10 Bcf per day of LNG supply by 2010. This represents phenomenal growth for the LNG industry, especially when the key ingredient historically required to promote and finance LNG development—long-term, fixed-price contracts with creditworthy buyers—has been rare in the US market in recent years. In addition, many LNG developers face opposition to their proposed projects, especially on the Pacific and Atlantic seaboards.

Importantly, CERA sees no feasible way to meet long-term natural gas demand without substantial new LNG facilities. The opening of additional federal lands and the addition of Arctic resources would cause a meaningful shift in US prices but are not sufficient to completely offset the need for LNG.

CERA expects LNG development to progress, with a concentration of new receiving terminals in a small area of southwest Louisiana and southeast Texas. Many projects are under construction, and several more have been permitted. In the aggregate, these projects are sufficient to meet America's growing need for imported natural gas. They will be constructed to withstand very large hurricanes. However, it is evident that if the LNG industry is forced to concentrate its facilities in the Gulf of Mexico—and that is our current path—a large hurricane affecting this area would create a substantial disruption to natural gas supplies by causing, at best, the temporary suspension of LNG deliveries. This underscores the need to focus on developing receiving terminals not only in the Gulf, but also in other geographic regions.

Natural Gas Demand Growth All but Assured

The current market environment has not been caused by a surge in demand. In fact, demand growth for natural gas has been modest in the past several years, as demand losses in the industrial sector and efficiency gains in the power sector have helped to stem demand growth. But that is changing. Demand increases are all but assured in the years ahead.

The largest natural gas consuming sector is the industrial sector. Industrial consumers have historically exhibited the most flexibility in response to prices, curtailing natural gas consumption during price spikes. However, sustained higher natural gas prices, along with a host of other factors, have led to permanent demand loss—the shuttering of facilities and the migration of plants and factories overseas to areas with cheaper natural gas. This has not only reduced overall industrial demand, but has also left the natural gas industry with a significantly reduced shock absorber to respond to price spikes. For example, despite record high natural gas prices in 2004, industrial demand actually grew, owing to strong demand for the products produced by gas-intensive industries and constraints on importing substitute products. Nevertheless, CERA expects that sustained higher natural gas prices will continue to slowly erode demand from the US industrial sector.

In contrast to CERA's outlook for a decline in industrial gas demand, consumption from the other three natural gas consuming sectors—residential, commercial, and power—is expected to continue to grow. Despite steady efficiency gains in the use of natural gas, and new initiatives toward conservation, the growing use of this fuel in more homes, businesses, and power plants virtually assures rising consumption of natural gas. Owing to lengthy project lead times for coal and nuclear generation facilities—often in excess of a decade—displacing natural gas–fueled power plants with new, non–gas-fueled plants is not a near-term option. In addition, very few homes, businesses, and power plants have the flexibility to use alternative fuels. In the power sector, retrofitting power plants to burn alternative fuels is not being widely considered, owing to plant and environmental restrictions and to higher oil product prices.

Certain existing power plants that do not burn natural gas but instead burn oil products or coal could be more highly utilized. These plants are typically older and less efficient than new gas-fired plants. Many of these plants are under emissions restrictions that limit their operation. Although these restrictions are well intentioned, they can often force the use of gas-fired power plants instead. Restrictions on all non–gas-fired power plants should be weighed against the additional demand pressures that are shifted to the natural gas market owing to these restrictions. Judicious flexibility can be of critical importance.

Gas demand growth from the power sector is inevitable, both in the near term and over the longer term, as long as the economy grows. A large wave of new power plants was added in the past six years, and over 90 percent of these plants burn nothing but natural gas. Relative to natural

gas–fired power plants, existing coal, nuclear, and hydroelectric power plants—which make up virtually all of the rest of the power plant fleet—are cheaper today to operate on a cash-cost basis. However, these coal, nuclear, and hydroelectric power plants are operating essentially at capacity. Thus, as economic growth drives electricity demand, gas-fired power plants will become more highly utilized despite higher natural gas prices, increasing the consumption of gas. Well over half of the growth in electricity demand will be met by gas-fired generation in the next several years. Moreover, the next wave of power plants will likely include gas-fired generation.

Many industry observers, reacting to sustained higher natural gas prices, are now advocating new coal plants, renewables, and nuclear power plants to diversify generation portfolios. Plans are gaining momentum for new coal and nuclear plants that will come online several years from now. Long-term gas demand growth will be affected significantly by fuel choice for new power plants. CERA expects that substantial new coal facilities will be added, but that gas demand will continue to grow nonetheless.

CERA expects natural gas demand in the United States to grow by 8.2 percent by 2010 and by an additional 7.2 percent between 2010 and 2020.

Encouraging Conservation and Energy Efficiency

Per-customer residential demand in the United States has declined continuously and dramatically since 1971, illustrating that efficiency effects are substantial but take a long time to show results. These per-customer demand decreases result from ongoing efficiency improvements in end-use equipment as well as from improved insulation in housing units, the latter often driven by building codes.

The current market environment suggests the need to redouble conservation efforts. Experience shows that the potential effect of customer conservation can vary widely depending on the type of policies or initiatives that governments or utilities launch and on the magnitude of cost savings that the policies (often through rebates or other incentives) offer.

Balancing the market through conservation is challenging. Recent experience suggests that consumers will conserve in the event of a crisis, in response to high prices, or in response to utility incentive programs. This presents something of a conundrum. A crisis, to consumers, is an event of short duration. They expect the crisis to be resolved. Inducing conservation through high prices is not a palatable policy approach. Utility incentive programs do encourage conservation, primarily by providing financial incentives for earlier installation of more efficient equipment. These programs are potentially costly, however, and they take time to implement. Moreover, continuous gains require continuous incentives.

Still, conservation—when effective—can be a powerful weapon against tight energy markets. CERA tested a hypothetical conservation case in which natural gas heating customers adopt a uniform conservation measure across the United States every day for a typical winter (November to March). This measure assumes that all residential and commercial customers in the United States turn their thermostats down by 2 degrees Fahrenheit for the entire heating season. With this conservation measure, average heating demand is estimated to decline by 3.2 Bcf per day—about 8 percent—over the winter period, compared with average winter heating demand without the conservation measure. A cutback in demand of 3.2 Bcf per day is substantial and would reduce prices; it would have a larger impact on the market than that caused by Hurricane Katrina. However, this is purely a hypothetical analysis; the challenge of convincing all consumers to reset their thermostats is enormous, to say the least.

Sensitivity of the Gas Market to Events

Another factor further complicates the picture: the sensitivity of this tightly balanced gas market to supply and demand shocks. Both winter heating and summer air conditioning rely on

natural gas. As a result, a colder-than-normal winter or hotter-than-normal summer can stress this already tight market, sending prices even higher. The United States has enjoyed generally mild weather over the past few years. However, summer 2005 illustrated the lack of flexibility in the industry to increased demand, pushing prices even higher.

Impact of Hurricane Katrina

Hurricane Katrina delivered a large supply shock to a market that was still absorbing a demand shock from hot weather–driven growth in natural gas consumption for power production. The total supply lost from the event will not be known for some time. The market will rely on supplies from other regions and on storage gas to meet consumer needs in the near term. However, this results in using gas that was originally destined to be placed into storage for winter needs.

If Katrina has as big as an impact on natural gas supply as Hurricane Ivan had in 2004—and CERA expects Katrina's impact to be greater—then the United States could enter winter with below-average storage volumes. The United States needs additional amounts of storage gas, owing to growing overall demand and greater seasonality of demand. Thus, there will be growing concern about the adequacy of winter supply, and this anxiety will be evidenced in higher natural gas prices through 2005 and 2006.

Conclusion

North America's natural gas supply shortfall—the clear inability of domestic supply from available lands to keep pace with demand—will challenge the US natural gas market until at least 2008. This supply shortfall comes at a time when there is a growing appetite for natural gas. If no near-term measures are taken to boost supply or to dampen demand, the United States is set to experience a continuation of higher prices. This should not catch the United States off guard, since the fundamental drivers of this market condition have been forming slowly over the past few years.

This supply dilemma is provoking a response—in the form of investment, technology, and adjustment. This response will be evidenced by new supplies, alternative power technologies, and shifts by consumers. But the time lags for new, large sources of natural gas supply are different today. They are not the one-to-two-year lags that characterized the ability of the domestic industry to grow supply ten years ago, but instead are defined by the time needed to construct new, complicated supply chains with high capital costs. CERA expects the development of new LNG facilities to bring enough new supply into North America to reduce prices and volatility beginning in 2008. It will be important to facilitate, and not to impede, this important, new, long-term resource.

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